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P O BOX 980			YOUNG, NATASHA E	
VALLEY FORGE, PA 19482-0980				
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/502,236

Applicant(s)

CARNELL ET AL.

Examiner

NATASHA YOUNG

Art Unit

1797

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 September 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-6, 8-9, 11 and 14-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) 1, 2, 4, 5, 8, 9, 11 and 14-16 is/are rejected.
- 7) ☐ Claim(s) 3, 6 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/808)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

The finality of the previous Office action is hereby withdrawn in view of the response of September 2, 2008. The amendment filed on September 2, 2008 has been entered.

Response to Arguments

Applicant's arguments filed September 2, 2008 have been fully considered but they are not persuasive.

The applicant(s) argues:

1. Nivens et al does not disclose removing elemental sulfur.

The examiner disagrees.

Nivens et al discloses elemental sulfur present in sour hydrocarbons and effective corrosion inhibitors are secondary aliphatic and heterocycline amines (see column 2, line 50 through column 3, line 29), sulfur compounds and elemental sulfur react with corrosion inhibiting additives (see column 4, lines 13-23), and the amines in the wash solution, in conjunction with the other ingredients of the wash solution, are effective in removing from the interior pipeline surfaces the sulfur complexes and compounds produced by the reaction of the additive with the sulfur and sulfur compounds in the sour hydrocarbon fluids (see column 7, lines 26-59) which disclose that the amines react with elemental sulfur and then are used to remove the sulfur complexes and compounds produced by the reaction of the additive with the sulfur and sulfur compounds such that Nivens et al discloses removal of elemental sulfur by the use of secondary aliphatic amines.

2. The combined teachings of Nivens et al and Ayers et al do not arrive at the claimed invention.

The examiner disagrees.

Specifically column 4, line 56 through column 5, line 26 of Nivens et al discloses light amines having a molecular weight from about 31 to 150 and heavy amines having a molecular weight from 151 to 500 and that mixtures of light and heavy amine are more effectively in removing and complexing sulfur, sulfur compounds, and the like than the use of either the light amine or heavy amine alone.

Nivens et al discloses the use of amines, is effective and results in reduced tendencies to form gums and the like (see column 6, lines 48-52).

Ayers et al discloses resinous absorbent of primary, secondary, or tertiary amine groups, preferably of the aliphatic type, are exposed to the gases and petroleum fractions flowing thereover, reacts with the hydrogen sulfide and mercaptans contained therein to permit only the hydrocarbons to escape from the vessel (see column 2, line 26 through column 3, line 5).

Nivens et al discloses the use of secondary aliphatic amines in the removal of elemental sulfur from sour hydrocarbon (see column 2, line 50 through column 3, line 29; column 4, lines 13-23; and column 7, lines 26-59).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the teachings of Ayers et al with the teachings of Nivens et al in order to use the corrosion inhibitor of Nivens et al in chemical compounds to remove elemental sulfur, sulfur compound, and the like, since both references disclose

a hydrocarbon stream to be treated and a secondary aliphatic type amine to remove impurities like hydrogen sulfide, mercaptans, elemental sulfur, sulfur compounds, and the like.

3. Nivens is not analogous art.

In response to applicant's argument that Nivens et al is nonanalogous art, it has been held that a prior art reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the applicant was concerned, in order to be relied upon as a basis for rejection of the claimed invention and since Nivens et al solves the problem the applicant is concerned with (see response to the second argument), Nivens et al is analogous.

4. That a *prima facie* case of obviousness was not shown.

The examiner disagrees based on previous response to arguments.

5. Applicant's arguments, see Remarks (see page 6 through page 7), filed September 2, 2008, with respect to the rejection(s) of claim(s) 2 under U.S.C. 103(a) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Duisters et al (EP 0 319 615 A1) and Carnell et al (US 6,221,241 B1).

6. Applicant's arguments, see Remarks (see page 7 through page 8), filed September 2, 2008, with respect to the rejection(s) of claim(s) 3-6 under U.S.C. 103(a) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Duisters et al (EP 0 319 615 A1).

7. The addition of Duisters et al does not overcome the deficiencies of Ayers et al and Nivens et al, since Duisters et al does not disclose the removal of elemental sulfur and a sulfided ion exchange resin.

The examiner agrees.

However, Duisters et al discloses the removal of ionic mercury by an ion exchange resin containing active thiol groups (see Abstract and column 1, lines 9-18).

Ayers et al discloses resinous absorbent of primary, secondary, or tertiary amine groups, preferably of the aliphatic type, are exposed to the gases and petroleum fractions flowing thereover, reacts with the hydrogen sulfide and mercaptans contained therein to permit only the hydrocarbons to escape from the vessel (see column 2, line 26 through column 3, line 5) such that after the hydrocarbon is treated, the resin is saturated with hydrogen sulfide and mercaptans.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the teachings of Ayers et al with the teachings of Duisters et al in order to use the mercaptan-saturated resin to remove ionic mercury from a feed stream.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.

Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1, 4-5, and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ayers et al (US 2,592,523) in view of Nivens et al (US 4,011,882).

Regarding claim 1, Ayers et al discloses a method of making a sulphided ion exchange resin containing primary or secondary amino groups and the concomitant removal of hydrogen sulfide and mercaptans from a non-aqueous liquid feedstock comprising passing said feedstock containing hydrogen sulphide and mercaptans through a bed of an ion exchange resin containing primary or secondary amino groups,

thereby forming a sulphided ion exchange resin containing primary or secondary amino groups (see column 2, line 26 through column 3, line 5).

Ayers et al does not disclose the removal of elemental sulphur from a liquid hydrocarbon feedstock.

Ayers et al discloses the use of a secondary aliphatic amine in the resin (see column 2, lines 26-39).

Nivens et al discloses elemental sulfur present in sour hydrocarbons and effectively corrosion inhibitors are secondary aliphatic and heterocycline amines (see column 2, line 50 through column 3, line 29), sulfur compounds and elemental sulfur react with corrosion inhibiting additives (see column 4, lines 13-23), and the amines in the awash solution, in conjunction with the other ingredients of the wash solution, are effective in removing from the interior pipeline surfaces the sulfur complexes and compounds produced by the reaction of the additive with the sulfur and sulfur compounds in the sour hydrocarbon fluids (see column 7, lines 26-59) which disclose that the amines react with elemental sulfur and then are used to removed the sulfur complexes and compounds produced by the reaction of the additive with the sulfur and sulfur compounds such that Nivens et al discloses removal of elemental sulfur by the use of secondary aliphatic amines.

Nivens et al does not disclose passing the feedstock containing elemental sulfur through a bed of an ion exchange resin containing primary or secondary amino groups.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the teachings of Ayers et al with the teachings of Nivens

et al in order to use the corrosion inhibitor of Nivens et al in chemical compounds to remove elemental sulfur, sulfur compound, and the like, since both references disclose a hydrocarbon stream to be treated and a secondary aliphatic type amine to remove impurities like hydrogen sulfide, mercaptans, elemental sulfur, sulfur compounds, and the like.

Regarding claim 4, Ayers et al does not disclose the ion exchange resin is in the form of a fixed bed of shaped units having maximum and minimum dimensions in the range of 0.5 to 10 mm.

However, Ayers et al discloses a fixed bed but the size of the granular absorbent was not given (see column 2, line 26 through column 3, line 5).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the ion exchange resin is in the form of a fixed bed of shaped units having maximum and minimum dimensions in the range of 0.5 to 10 mm, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art (see MPEP 2144.05 (II-A)).

Regarding claim 5, Ayers et al does not disclose the liquid hydrocarbon feedstock is contacted with the ion exchange resin bed at temperatures in the range of 10°C to +100°C under sufficient pressure that the feedstock is in the liquid state.

Ayers et al discloses a packed condenser (see column 2, line 26 through column 3, line 5), which would have sufficient pressure such that the feedstock is in the liquid state.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the liquid hydrocarbon feedstock is contacted with the ion exchange resin bed at temperatures in the range of 10°C to +100°C under sufficient pressure that the feedstock is in the liquid state, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art (see MPEP 2144.05 (II-A)).

Regarding claim 8, Ayers et al discloses the liquid hydrocarbon is selected from the group consisting of natural gas liquids and gasoline (see column 1, lines 11-32).

Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ayers et al (US 2,592,523) and Nivens et al (US 4,011,882) as applied to claim 1 above, and further in view of Duisters (EP 0 319 615 A1) and Carnell et al (US 6,221,241, B1).

Regarding claim 2, Ayers et al does not disclose the liquid hydrocarbon feedstock is passed through a bed of a hydrogen sulphide absorbent after passage through the bed of the ion exchange resin.

However, Ayers et al discloses resinous absorbent of primary, secondary, or tertiary amine groups, preferably of the aliphatic type, are exposed to the gases and petroleum fractions flowing thereover, reacts with the hydrogen sulfide and mercaptans contained therein to permit only the hydrocarbons to escape from the vessel (see column 2, line 26 through column 3, line 5) such that after the hydrocarbon is treated the resin is saturated with hydrogen sulfide and mercaptans.

Duisters et al discloses the removal of ionic mercury an ion exchange resin containing active thiol groups (see Abstract and column 1, lines 9-18).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the teachings of Ayers et al with the teachings of Duisters et al in order to use the mercaptans-saturated resin to remove ionic mercury from a feed stream.

Carnell et al discloses absorbent beds where the first bed (3a) absorbs mercury and the other beds (4a, 3b, 4b) absorb hydrogen sulfide (see column 5, lines 9-61 and figures 1 and 3).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the combined teachings of Ayers et al and Duisters et al with the teachings of Carnell et al such that the liquid hydrocarbon feedstock is passed through a bed of a hydrogen sulphide absorbent after passage through the bed of the ion exchange resin in order to improve purification of the feed stream by removing both mercury, elemental sulfur, and hydrogen sulfide.

Claims 9, 11, and 14-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ayers et al (US 2,592,523) and Nivens et al (US 4,011,882) as applied to claim 1 above, and further in view of Duisters et al (EP 0 319 615 A1).

Regarding claim 9, Ayers et al does not disclose said liquid hydrocarbon feedstock further comprises mercury or inorganic mercury compounds, and wherein at least the inlet portion of the bed of an exchange resin is sulphided before a mercury containing stream is passed through the bed, thereby to remove said mercury or organic mercury compounds from said liquid hydrocarbon feedstock.

However, Ayers et al discloses resinous absorbent of primary, secondary, or tertiary amine groups, preferably of the aliphatic type, are exposed to the gases and petroleum fractions flowing thereover, reacts with the hydrogen sulfide and mercaptans contained therein to permit only the hydrocarbons to escape from the vessel (see column 2, line 26 through column 3, line 5) such that after the hydrocarbon is treated the resin is saturated with hydrogen sulfide and mercaptans.

Duisters et al discloses the removal of ionic mercury an ion exchange resin containing active thiol groups (see Abstract and column 1, lines 9-18).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the teachings of Ayers et al with the teachings of Duisters et al in order to use the mercaptan-saturated resin to remove ionic mercury from a feed stream.

Regarding claim 11, Ayers et al discloses a method for passing a liquid hydrocarbon feedstock through a bed of a sulphided ion exchange resin containing primary or secondary amino groups according to claim 1.

Ayers et al does not disclose a method for the removal of mercury and organic mercury compounds from a non-aqueous liquid feedstock comprising passing the feedstock through a bed of a sulphided ion exchange resin containing primary or secondary amino groups according to claim 1.

However, Ayers et al discloses resinous absorbent of primary, secondary, or tertiary amine groups, preferably of the aliphatic type, are exposed to the gases and petroleum fractions flowing thereover, reacts with the hydrogen sulfide and mercaptans

contained therein to permit only the hydrocarbons to escape from the vessel (see column 2, line 26 through column 3, line 5) such that after the hydrocarbon is treated the resin is saturated with hydrogen sulfide and mercaptans.

Duisters et al discloses the removal of ionic mercury an ion exchange resin containing active thiol groups (see Abstract and column 1, lines 9-18).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the teachings of Ayers et al with the teachings of Duisters et al in order to use the mercaptan-saturated resin to remove ionic mercury from a feed stream.

Regarding claim 14, Ayers et al discloses the liquid is selected from the group consisting of natural gas liquids and gasoline (see column 1, lines 11-32).

Regarding claim 15, Ayers et al does not disclose the ion exchange resin is in the form of a fixed bed of shaped units having maximum and minimum dimensions in the range of 0.5 to 10 mm.

Ayers et al discloses a fixed bed but the size of the granular absorbent was not given (see column 2, line 26 through column 3, line 5).

Duisters et al discloses a polymeric sulfonic acid resin catalyst of an average diameter of 0.3 mm about to 1.2 mm (see column 2, lines 34-44).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of Ayers et al with the teachings of Duisters et al to remove more than 97% of the mercury in the feedstock (see page 3, column 1, 4th paragraph).

Regarding claim 16, Ayers et al does not disclose the non-aqueous liquid feedstock is contacted with the ion exchange resin bed at temperatures in the range of 10°C to +100°C under sufficient pressure that the feedstock is in the liquid state.

Ayers et al discloses a packed condenser (see column 2, line 26 through column 3, line 5), which would have sufficient pressure such that the feedstock is in the liquid state.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the liquid hydrocarbon feedstock is contacted with the ion exchange resin bed at temperatures in the range of 10°C to +100°C under sufficient pressure that the feedstock is in the liquid state, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art (see MPEP 2144.05 (II-A)).

In addition, Duisters et al discloses the non-aqueous liquid feedstock is contacted with the ion exchange resin bed at temperatures in the range of 10°C to +100°C (see column 2, line 49-54) under sufficient pressure that the feedstock is in the liquid state (see column 2, line 55 through column 3, line 5).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of Ayers et al with the teachings of Duisters et al to remove more than 97% of the mercury in the feedstock (see column 3, lines 33-37).

Allowable Subject Matter

Claims 3 and 6 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Regarding claim 3, the prior art does not disclose or suggest the teachings of the removal of water from the ion exchange resin before use.

Regarding claim 6, the prior art does not disclose or suggest the teachings of the ion exchange resin is periodically regenerated by treatment with an acid.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to NATASHA YOUNG whose telephone number is (571)270-3163. The examiner can normally be reached on Mon-Thurs 7:30am-6:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Walter Griffin can be reached on 571-272-1447. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a

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USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/NY/

/Walter D. Griffin/
Supervisory Patent Examiner, Art Unit 1797